R E P O R T R E S U M E S

ED 017 740 VT 005 159

NEEDED RESEARCH ON DIFFUSION WITHIN EDUCATIONAL ORGANIZATIONS.

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PUB DATE 68

EDRS PRICE MF-$0.25 HC-$1.44 34P.

DESCRIPTORS- *DIFFUSION, INFORMATION DISSEMINATION, *EDUCATIONAL INNOVATION, *RESEARCH METHODOLOGY, RESEARCH NEEDS, *ORGANIZATION, SPEECHES, *INTERPERSONAL RELATIONSHIP, COMMUNICATION (THOUGHT TRANSFER),

IN SPITE OF THE VOLUME OF RESEARCH ATTENTION DEVOTED TO THE DIFFUSION OF INNOVATIONS, RELATIVELY LITTLE EMPHASIS HAS BEEN PLACED UPON DIFFUSION WITHIN ORGANIZATIONAL STRUCTURES. METHODOLOGICALLY, RELATIONAL ANALYSIS IN WHICH THE UNIT OF ANALYSIS IS A TWO-PERSON INTERACTING PAIR, A MULTIPLE PERSON COMMUNICATION CHAIN, OR CLIQUES OR SUBSYSTEMS IS NEEDED IN PLACE OF INVESTIGATION IN WHICH THE UNIT OF ANALYSIS IS THE INDIVIDUAL. RELATIONAL ANALYSIS IS ESPECIALLY ADVANTAGEOUS IN DETERMINING THE DEGREE TO WHICH TWO INDIVIDUALS WHO INTERACT ARE SIMILAR. PROCEDURALLY, THE STUDY OF STRUCTURAL EFFECTS AS SYSTEM VARIABLES IN THE DIFFUSION OF INNOVATIONS WITHIN EDUCATIONAL ORGANIZATIONS IS NEEDED. STRUCTURAL EFFECTS ARE THE CONSEQUENCES ON ONE'S BEHAVIOR OF THE SOCIAL STRUCTURE OF THE SYSTEM IN WHICH ONE IS A MEMBER. CONCEPTUALLY THE STUDY OF FOUR INTERRELATED CATEGORIES OF VARIABLES IS NEEDED--DIFFUSION EFFECTS VARIABLES, COMMUNICATION VARIABLES, SOCIAL SYSTEM VARIABLES, AND CONSEQUENCES VARIABLES. ENLARGING THE MODEL OF DIFFUSION REASEARCH TO INCLUDE A CLASS OF MORE ULTIMATE DEPENDENT VARIABLES DEALING WITH INNOVATION CONSEQUENCES AND MORE SOCIAL STRUCTURAL VARIABLES, AND UTILIZING SUCH METHODOLOGICAL ADVANCES AS RELATIONAL ANALYSIS AND THE STUDY OF STRUCTURAL EFFECTS IN DIFFUSION INVESTIGATION, WILL RESULT IN A BETTER INSIGHT INTO HUMAN BEHAVIORAL CHANGE IN ORGANIZATIONAL SETTING, AS WELL AS IMPLICATIONS FOR MORE RAPID EDUCATIONAL DIFFUSION. THIS PAPER WAS DELIVERED AT THE NATIONAL CONFERENCE ON THE DIFFUSION OF EDUCATIONAL IDEAS (EAST LANSING, MARCH 26-28, 1968). (MM)

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NEEDED RESEARCH ON DIFFUSION WITHIN EDUCATIONAL ORGANIZATIONS

by

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Paper presented at the National Conference on the Diffusion of Educational Ideas, East Lansing, Michigan, March 26-28, 1968. Sponsored by the Research Coordinating Unit of the Vocational Education Division of the Michigan Department of Education In cooperation with The United States Office of Education and The Department of Communication and Continuing Education Service, Michigan State University.

VT005159

Errata Sheet

1. Pg. 7, 1st Para., line 3 - close parentheses after the word "system".
2. Pg. 9, line 12, should read "Why would we expect...."
3. Pg. 16, 1st Para., line 2, should read "Katz and Kahn (1966)...."
4. Pg. 16, 1st Para., line 4, should read function.
5. Pg. 16, 1st Para., line 5, should read management.
6. Pg. 16, 2nd Para., line 3, should read process.
7. Pg. 23, line 8, should read participative.
8. Pg. 27, 1st Para., line 5, should read when instead of then.
9. References Cited: Pg. 2, reference 27, should read (1968) instead of (1967).
10. Please include the following reference:

    Grittell, Marilyn and Hollander, T.E. (1968), Six Urban School Districts: A Comparative Study of Institutional Response, New York, Praeger.

> It is our observation at the present time that one of the great tragedies in American education and social practice is that a large proportion of the creative inventions which are in line with good research and theory never become visible and never become appropriately transmitted from one setting and practitioner to another.
>
> (Ronald Lippitt, 1965)

HISTORICAL BIASES IN DIFFUSION RESEARCH

Diffusion research began in the late 1930's and early 1940's with studies of farmers. These investigations were sponsored by the sources of innovations, agricultural extension services, so as to enable speeding the diffusion of farm innovations. The researchers were originally rural sociologists, and their respondents were mainly farmers, who were asked to recall how they learned about and adopted new ideas.

These beginnings of diffusion research have left an indelible stamp on the approaches, concepts, methods, and assumptions of the field, some 25 years and 1,300 publications later. And often the "biases" that we inherited from our research ancestors have been quite inappropriate for the important diffusion research tasks of today. Strange that the study of innovation has itself been so traditional!

What are two of the most important biases that we diffusion researchers implicitly adopted as a result of our historical past?

1. Diffusion research has largely been a tool on the side of sources, not receivers of innovation diffusion.* How different

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*The main exception of source-sponsorship of diffusion research is the series of studies under the direction of the late Paul Mort at Columbia University Teachers College, which were funded by organizations of progressive-minded schools.

would our knowledge of diffusion processes be today if the first studies had been sponsored by farmers rather than extension services? Maybe the field would be called something like "innovation-seeking," rather than "diffusion."

2. Because the data were gathered from individuals as the units of response, largely via field surveys, our focus has been upon individual, intra-personal variables, largely to the exclusion of social structural and organizational variables.* We erroneously assumed that because individuals were the units of response, individuals also had to be the units of analysis. But the point is that teachers do work in organizational settings like schools, even if farmers do not. And the organizational environment does have an important influence on teachers' innovative behavior.

The first so-called bias (source sponsorship) leads to consideration of the ethical implications of diffusion research (and perhaps of much other social science inquiry); however, this theme is beyond the scope of the present essay. We will deal with one particular consequence of the second bias (the focus on intra-personal variables), and seek to suggest a route to its possible amelioration. This research map will center around needed investigations on the diffusion of new ideas within educational organizations. In this pursuit, we must stray far from the core of most completed diffusion research, and

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*And also, strangely, to the exclusion of personality variables in diffusion and adoption. This is odd only because personality variables are such an important type of intra-personal variables. It probably occurred (1) because diffusion researchers were (and are) mostly sociologists and anthropologists, rather than psychologists or social psychologists; and (2) because personality variables are generally difficult to measure in field (as opposed to laboratory) settings.

wander (conceptually) into the arena of organizational theory, systems analysis, structural effects, and matrix multiplication. These research approaches have, in the past, largely been considered beyond the pale of conventional diffusion research. One assumption is that there is theoretical profit in bringing such divergent approaches into the diffusion fold, and conversely, in extending the nature of diffusion inquiry to greater attention to structural factors.

The format of this paper consists of discussion (1) of needed methodological approaches to the study of diffusion within organizations, and (2) of potential conceptual emphases.

NEEDED METHODOLOGICAL APPROACHES

I feel we must focus on two different (but related) approaches in studying diffusion in organizational settings: (1) relational analysis, and (2) structural analysis.

1. Relational Analysis

Professor James Coleman (1955) of Johns Hopkins University sagely called for an overhaul of our entire research attack in sociology, which I feel is even more appropriate in any type of communication research. He urges us to abandon our concern with <u>individuals</u> as units of analysis in favor of <u>relations</u> between individuals as units of analysis. Diffusion processes (and, in a more general sense, all communication processes) are, after all, a series of transfers of messages from sources to receivers. So it is entirely appropriate to utilize relationships, transactions, pairings, chains - as our units of analysis in diffusion inquiry, rather than individuals, which Coleman says amounts to a rather poor "aggregate psychology." But

very few past diffusion studies followed Coleman's admonition, even those researches conducted in organizational settings.*

Coleman (1955) traces reasons for our over-emphasis upon individuals to the neglect of communication relationships. Mainly, he blames survey research methods, which lead to the neglect of social structure and relationships among individuals. "Samples were random, never including (except by accident) two persons who were friends; interviews were with one individual, as an atomistic entity, and responses were coded onto separate IBM cards, one for each person" (Coleman, 1955).

But most recently, some social scientists have come to realize that even with use of survey methods, which are often essential to gathering large-scale amounts of data as a basis for generalization, various techniques of measurement, data-gathering, and data-analysis can be utilized to provide focus on relationships rather than on individuals. And, important for the present paper, these newer methods are especially useful when the research locus is a highly-structured system, like a formal organization.

In short, the measurement devices center around some type of sociometric question, the data-gathering techniques consist of sampling intact groups (or sub-systems) or pairs of individuals (as with so-

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*My content analysis of approximately 1,000 empirical diffusion studies in the Michigan State University Diffusion Documents Center shows only about 50 or 5 percent utilized a dyadic approach, one type of relational analysis.

called "snowball sampling"*), and the data-analysis methods amount to using the dyad, chain, or the sub-system as the unit of analysis.

How might relational analysis be used in diffusion investigations?

1. Dyadic analysis of sociometric data about innovation diffusion entails obtaining information from source-receiver pairs. The communication dyad (or two-person interacting pair) may be located by asking a sociometric question like "Who first told you about modern math?" or "Who convinced you to adopt modern math?" Such questions have been widely utilized in past diffusion studies, but not as a basis for forming communication dyads. In one sense, the dyad is the most elemental, primitive unit in interpersonal diffusion. It deserves more research attention.

A variety of important research questions, such as the following, can be answered with such dyadic analysis.

(i) To what extent does diffusion occur between individuals who are homophilous in their characteristics, beliefs, and attitudes? Homophily is the degree to which two individuals who interact are similar. There is an implication from past diffusion research that much innovation flow occurs between pairs of individuals who are quite homophilous, although the extent of such homophily seems to depend upon such variables as the traditionalism of the system's norms, the nature of the variables on which homophily is measured (such as social status, innovativeness, etc.), and the nature of the innovation.**

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*A term used to describe a sampling design in which (1) a random sample of individuals are asked a sociometric question, for example, from whom they obtained information about a new idea; and (2) then the individuals so named are interviewed at a second stage. The snowballing can, of course, be continued to third, fourth, etc. stages.

**For instance, we would expect to find a high degree of social status homophily in the diffusion of an innovation that was only appropriate for high status members of a social system. Those of high status would interact mainly with others of high status about the innovation.

(ii) When some heterophily (the opposite of homophily) does occur, do receivers seek sources (pairwise) who are higher or lower in social status, innovativeness, technical competence, etc.? In other words, is there a "trickle-down" or a "trickle-up" of innovation in a social system? What characteristics of the system, the individuals, or the innovations determine whether these heterophilous communication patterns are upward or downward bound?

2. Chain analysis is essentially similar to dyadic analysis in respect to its dependence upon sociometric data, but differs in that multiple-person communication chains are the units of analysis, rather than dyadic pairs. A communication chain consists of any number of individuals in a system, starting with a source person and sequentially continuing through all the related individuals who are his direct or indirect receivers. Essentially, chain analysis consists of a number of linked dyads in which the receiver in one dyad is the source in the next. Statistical methods for the complete analysis of chains are not yet well developed, and most diffusion chains are now analyzed via diagramatic plotting and visual inspection. Matrix multiplication by computer provides one means of statistical chain analysis.

3. Clique or sub-system analysis consists of sociometrically determining the communication groupings among the members of a social system. Such clique identification may be accomplished via the visual plotting of sociometric data unless the number of individuals involved is numerous and/or the interpersonal relationships are complex. In these cases, one should resort to the matrix multiplication procedures suggested by Hubell (1965) or Festinger (1949). Essentially, these techniques consist of reducing the sociometric data about diffusion to a

"who-to-whom" matrix in which the source individuals are located on one dimension of the matrix and the receivers on the other. The matrix is squared, then cubed, etc., usually by computer techniques. Through this procedure, existence of diffusion cliques soon becomes apparent within the total system. Such informal communication cliques can be then compared with the formal organization of the system in order to determine how well the formal structure predicts or explains actual diffusion patterns.

Further, matrix multiplication locates (on the diagonal of the matrix with successive self-multiplication) the "liaison" individuals who link two or more cliques (if such linkage occurs in a system. One may then proceed to determine the characteristics of these liaison persons, who act as "diffusion gatekeepers."*

STRUCTURAL EFFECTS AS SYSTEM VARIABLES

An obvious reason for our scientific interest in social structure is that it has an important influence on individual behavior, including the adoption of new ideas. Yet past diffusion inquiry seems to have inplicitly assumed that such structural effects are not worth much study. More recently, however, a couple of investigations suggest that such structural effects may be of much importance in explaining individual innovative behavior.

1. For example, in an analysis of the diffusion of innoations to teachers in Thai government secondary schools, Mortimore (1968) found very low correlations, most of which were not significant, between 51 independent variables and (1) teacher's awareness of new educational innovations, (2) favorable attitudes toward these new

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*A research focus upon the role of liaison individuals was initiated by Jacobson and Seashore (1951), and followed by Weiss and Jacobson (1955).

ideas, and (3) innovativeness. One reason for these low relationships very likely is the fact that structural effects were almost entirely ignored. The 51 variables, mostly drawn from U.S. educational diffusion studies, measured individual characteristics and attitudes, but paid no attention to school effects on teacher behavior. In other words, the analysis treated the teachers as if they did not work in schools, and as if the school did not have a considerable effect on each teacher's diffusion behavior. Yet it is one's fellow school teachers in Thailand with whom one interacts most about innovations. Their characteristics and beliefs thus have great effect on one's knowledge, attitude, and adoption of educational innovations.

2. Yet further evidence of the importance of structural (or compositional) effects in explaining individual innovativeness is provided by Quadir's (1966) analysis of data from some 600 villagers in 26 Philippine neighborhoods. He found that the compositional effects (of neighborhood mean education, mass media exposure, etc.) were about as effective as predictors of individual innovativeness, as were individual variables like education, media exposure, etc.

What are structural effects? They are effects of the social structure of the system in which one is a member, on his behavior.* For example, one can conceptualize a teacher's innovative behavior as explained by two types of effects: (1) the individual's personality, communication behavior, and attitudes; and (2) the makeup and norms of his school, that is, its social structure. The first class of variables are individual, the second are system variables. Both are used to predict a dependent variable at the individual level.

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*For a more complete discussion of structural effects than we can provide in the present paper, see Blau (1957 and 1961), Davis and others (1961), Tannenbaum and Bachman (1964), and Campbell and Alexander (1965).

In mathematical expression...

$$\hat{Y}_{ij} = a + b_i X_{ij} + c_i \bar{X}_{ij}$$

Where $\hat{Y}_{ij}$ represents a teacher's (predicted) innovative behavior; X_{ij} represents a teacher's position on some predictor of his innovativeness, for example, his level of formal education; and $\bar{X}_{ij}$ represents his school's modal position on some predictor of innovativeness, for example, the average level of formal education of his fellow teachers.

The amount of variance in Y, teacher innovativeness, explained by $\bar{X}$'s, the system variables, is due to structural effects.

Why would be expect structural effects?

1. Any type of human behavior can be partitioned in terms of within and between variance. We generally find a much higher degree of homogeneity within social systems than between social systems. This may in part be due (i) to ecological reasons such as the similarity of climate, heredity, and so forth; (ii) to past interaction, because it is through such interpersonal communication that greater homogeneity (at least in attitudes and beliefs) results over time; and (iii) to selective atrraction factors, which act to draw similar individuals to the same kinds of groupings.

2. The group or the social system has a social structure (such as norms) which affect individual behavior in it, because the system is an important reference group influence on the individual's decisions, and because of the social control of the system over the individual's behavior.

The basic assumption of structural effects is that more variance in individual behavior can be explained by utilizing independent variables for both the individual and the social system of which he is a part, than by using only independent variables measured at the individual level alone. We ought to proceed to test this proposition with data about the diffusion of innovations to individuals within educational organization. Such investigation will lead to theoretical understandings about the role of social structure on individual behavior, as well as to practical insight about how to organize education in order to facilitate change. As yet, we lack research attention to social system variables as explainers of individual diffusion variables, and notably absent from our past analyses are one important type of system variables, those dealing with the structure of the system.

So far in this paper, we have explored two compatible methodological approaches to needed diffusion research in educational organizations: relational analysis and structural effects. Now let us shift our focus to the main types of concepts that we should explore in such studies.

POTENTIAL CONCEPTUAL EMPHASES IN DIFFUSION RESEARCH IN ORGANIZATIONS

We will focus on four interrelated categories of variables in our paradigm of the diffusion of innovations in educational organizations: (1) diffusion effects variables, (2) communication variables, (3) social system variables, and (4) consequences variables (see Figure 1). Let us explain briefly what is meant by each category of variables, before discussing the details in each category.

SOCIAL SYSTEM VARIABLES	COMMUNICATION VARIABLES	DIFFUSION EFFECTS VARIABLES	CONSEQUENCES VARIABLES
1. Social system norms (traditional-modern, for example)	1. Amount of relevant communication in the system.	1. Knowledge and understanding	1. Productivity or quality (e.g., amount of learning)
2. Leadership (for instance, its degree of concentration or its authoritarianism)	2. Direction of communication (for instance, whether downward, upward, or horizontal)	2. Attitude toward innovations ↘ Innovation dissonance	2. Efficiency (e.g., amount of learning per unit of cost)
3. Decision-making structure in the system	3. Asymmetry of communication flows	3. Adoption (or Innovativeness)	3. Morale
4. Characteristics of the system that affect the Behavior of its units (for example, the degree of consensus in the system or the existence of an adaptive unit in the system)	4. Innovation attributes (compatability, relative advantage, etc.) and nature of the innovation decision (for example, whether individual vs. collective)	4. Internalization	4. Self-renewal
5. Others	5. Communication channels (for example, mass media vs interpersonal, localite or cosmpolite, etc.)	5. Quality of use of the innovations	5. Others

Figure 1. Paradigm of Variables and Conceptual Relationshps in the Diffusion within Educational Organizations.

The diagram does not pretend to be a complete theoretical system; it is a summary paradigm designed to illustrate the main variables discussed in this paper.

1. Diffusion effects variables: These are the dependent variables in most studies, the variables which reflect the immediate effects of the diffusion of innovations. These include such dependent variables in diffusion research as knowledge and adoption of innovations, attitude toward innovations.

2. Communication variables: This category includes dimensions indicating the nature and amount of communication in an on-going organization, such as the number of relevant communication messages, accuracy of upward communication, etc. Under this category, we will also discuss such aspects of communication as the message attributes, channels, etc.

3. Social system variables: This category refers mainly to the structural characteristics of an organization. These variables are relatively unchanged over a sufficiently long period of time, and are relatively difficult to change. An instance is leadership style, a variable which could be manipulated via training and selection, but this only in the relatively long range.

4. Consequences variables: This category includes variables which reflect the consequences or effects of innovations in the organization, such as productivity, morale, etc.

Diffusion Effects Variables

Past innovation-diffusion research have been mostly concerned with such dependent variables as the time of awareness and the time of adoption of innovations (or innovativeness). In his study of three Michigan high schools, Lin (1966) measured two new dependent variables which he considered important in studying diffusion within organizations: (1) innovation internalization, defined as the extent

to which a member of an organization perceives the innovation to be relevant and valuable to his role performance, and (2) change orientation, defined as an individual's degree of general predisposition toward change.

In the very few past studies dealing with educational diffusion within organizations*, teacher innovativeness seems to be the most commonly studied variable. Teacher innovativeness within a school would be near zero if all teachers complied immediately and directly with their administrator's innovation decision, if there were 'perfect' communication of the decision, etc. Perhaps a major dependent variable in studies of forced innovation decisions should be the teacher's attitude toward the innovation or innovations. Overt behavior of its members may be manipulated by the organization, at least in the short range, but perhaps the teachers' attitudes toward innovations affect continued adoption versus discontinuance of the ideas over a relatively longer time period.

Table 1 shows yet another variable which might be studied in the case of forced decisions,** which often occur in organizational settings. Innovation dissonance is the discrepancy between the organization member's (in our case, teacher's) attitudes toward the innovation and the overt behavior (adoption or rejection) of the innovation as demanded by the organization (i.e., the school system). Types I and IV

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*Most past educational diffusion research has been concerned with school-to-school diffusion, where school innovativeness is the main dependent variable, rather than within-school diffusion. In fact, there are actually very few studies of within-organizational diffusion, whether in education, industry, or elsewhere. Examples of the few such studies available are: Becker and Stafford (1967), Carroll (1967), Knight (1967), Sapolsky (1967), Shepard (1967), Evan and Black (1967), Lin (1966), Wager (1962).

**A forced innovation decision is defined as one in which the individual has no legitimate influence, but is ordered to adopt or reject by others. In contrast, individual innovation decisions are those in which the individual has influence.

Table 1. - Four Dissonant-Consonant Types on the Basis of Individual Attitude Toward an Innovation and Overt Behavior Demanded by the Organization.*

Member's Attitude Toward the Innovation	Overt Behavior Demanded by Organization: Rejection		Overt Behavior Demanded by Organization: Adoption	
Unfavorable	I.	Consonant Rejector	II.	Dissonant Adopter
		P ↑ to C** (Pressures toward Consonance ←)		P ↓ to C** (Pressures toward Consonance ←)
Favorable	III.	Dissonant Rejector	IV.	Consonant Adopter
		Pressures toward Consonance →		

* Source: Adapted from Knowlton (1965, p.53).

**Pressures toward consonance.

in Table 1 are consonant, in that their behavior is in line with their attitudes. Type II and III both have cognitive dissonance (Festinger, 1957), because the member's attitude toward the innovation is discrepant with his behavior within the organization. The balance notion of tension-reduction suggests that there will be a tendency over time for Type II's and Type III's to (1) change their attitudes to make them consonant with the behavior demanded by the organization, or (2) discontinuance of the innovation, misuse of the innovation, or circumvention of the innovation order, to make their behavior consonant with their attitudes. This strain toward balance will cause Type II's and Type III's to become either Type I's or Type IV's, whichever is easier for the individual to achieve.

In summary, when an individual member's cognitive system is dissonant with the overt behavior toward an innovation demanded by the organization, the individual will attempt to reduce the dissonance by either changing his attitudes or his behavior.

The extent of knowledge and understanding of the innovation is another useful dependent variable. Often we have looked at time of awareness, but not at the extent or degree of awareness and understanding of the innovation. In organizational settings, mere awareness about an innovation (like knowing that team teaching is a new method of pedagogy) does not tell us much of use. What matters more is whether an individual (or teacher) knows and understands details about the innovations.

Even if an individual has a favorable attitude toward the innovation, and has adopted, without understanding the implications of the innovation, there is a high chance of misuse of the innovation leading to undesirable consequences. So quality of use of the innovation is another important dependent variable.

An innovation can be adopted in a variety of ways in terms of its quality of use, ranging from "use only for the sake of use" to very appropriate use. In educational organizations, where quality seems to be a main concern and the nature of teacher's job is both flexible and complicated, the quality of use of innovations seems to be an important variable, but one little-studied to date.

Communication Variables

Communication is the very essence of a social system or an organization. Ztaz and Kahn (1966) defined organizations from an "open system" viewpoint, characterizing an organization as both an energic and an informational system with the funciton of the informational system being managmeent of the system. There is a general consensus that communication is essential to the functioning of an organization.

There is hardly any need at this point to discuss the importance of communication in the diffusion process. Diffusion is a communication rpocess. It is that subset of communication, which deals with messages that are new ideas, or innovations. In organizational settings, the nature of the diffusion process for an innovation will be largely determined by the nature and amount of communication operating among the system's members. More specifically, the following aspects of the communication process in any organization seem crucial for understanding and predicting the diffusion of innovations.

1. Amount of relevant communication: In every organization, there are both formal and informal channels of communication. Often, the formal channels are characterized by the flow of messages relevant for achieving the organization's objectives, while the informal channels

carry other (irrelevant) messages. In some other organizations, and even in some units within an organization, both formal and informal channels are used extensively for communication aimed at achieving organizational goals and improving the functioning of the organization. In these systems, there is high amount of relevant communication for the organization. We expect these kinds of organizations to provide a conducive climate for innovations to diffuse.

2. Direction of communication:

(i) Downward communiation refers to the flow of information from superiors to subordinates, following the authority pattern of hierarchical positions. The classical theories of organization place primary emphasis upon this kind of communication. Organizations (also sub-units, and even organizational members) vary in the extent to which downward communication messages are accepted by subordinates. In some organizations, such communications are viewed with great suspicion, creating problems of misunderstanding and often rejection. In other organizations, downward communication is generally accepted, but if not, it is openly and candidly questioned, discussed, and clarified. We expect such organizations to facilitate the diffusion of innovations, which often flow downward through hierarchical channels of downward communication.

(ii) Upward communication is the flow of messages ascending the hierarchical ladder. Upward communication like downward, is essential for effective functioning of an organization. There is evidence that upward communication is often at least as inadequate as downward communication, and is probably less accurate because of the selective filtering of information which subordinates feed to their superiors (likert, 1961). Katz and Kahn (1966) observe that in autocratic

organizations, subordinates try to protect their position in the hierarchy by screening facts to accord with the perceived emotional biases of their superiors. This screening of upward communication takes place to some extent in all organizations, not only the more autocratic ones. In Read's (1962) study, the most important factor affecting the accuracy of messages from subordinates to superiors was the mobility aspirations of the lower status member. Another important factor was the interpersonal trust of the subordinate for his superior.

When upward communication in an organization is quite limited, and inaccurate, it becomes difficult to assess the 'true' reactions of organizational members (subordinates or teachers in case of schools) towards the innovations advocated by superiors. Initial resistance to the innovation may either not be communicated or may be distorted. Likert (1961) observes that the 'exploitive authoritative' organizations are characterized by inadequate and inaccurate upward communication, whereas 'participative' system of organization have a great deal of upward communication carrying relevant and accurate feedback information. The participative system provides a favorable climate for the diffusion of innovations, as superiors have adequate and accurate feedback information as to how teachers are reacting to innovations, and can clarify doubts and can overcome resistances.

(iii) Horizontal communication occurs between individuals at the same hierarchical level, for example, among two teachers. Some types of horizontal communication are critical for effective system functioning. Katz and Kahn (1966, p. 244) observe "communication among peers, in addition to providing task coordination, also furnishes emotional and social support to the individual..... Hence, if there

are no problems of task coordination left to a group of peers, the content of their communication can take forms which are irrelevant or destructive of organizational functioning."

In educational organizations, there seems to be great deal of sideward communication. There are few formal controls over the horizontal flow of information. But how far the sideward communication that goes on in the educational organizations, is concerned with matters of teaching and learning? Sieber (1967) states that "The insecure professional self-image of teachers might also account for a notable tendency among teachers to avoid informal communication on matters of teaching and learning. My own observation of faculty rooms over a period of a year suggests that informal discussion of classroom practices is minimal." Further evidence comes from a survey that requested teachers to nominate innovations they knew about that might contribute to the mental health condition of their pupils (Lippitt, 1965). Out of a total of 330 ideas that were mentioned, only 30 came from knowledge of what other teachers were doing: the overwhelming majority were practices that the teachers themselves were following. Lippitt concluded, "People usually do not know what other people are doing within their school buildings."

We know very little about the role of horizontal communication in the diffusion of innovations in educational organizations. How far does the "two-step flow of communication" operate in organizational diffusion among the peers? Since sideward communication is characterized by high homophily, this provides a climate for free and frank discussion about the innovation (if the organizational members feel motivated to talk about matters relevant to the organization) and thus have a more thorough understanding about the

innovation, and even peers can exert some influence for adoption.

3. Asymmetry of communication flows occur when the information requirements of superior and subordinate are not symmetrical or complementary. What the superior wants to know, is not what the subordinate wants to tell him; what the subordinate wants to know is not the message the superior wants to send. The greater the conflict between the communication needs of these two hierarchically-situated senders and recipients of messages, the more likely is an increase in lateral communication (Katz and Kahn, 1966, pp. 247). Communication asymmetry seems to be an important variable because it can explain some of the problems of misperceptions and misunderstandings in superior-subordinate communication exchanges which often lead to communication breakdowns. The concept of asymmetry bears a close relationship to our previously explained concept of heterophily.

For studying these communication variables, namely amount of relevant communication, direction of communication patterns and asymmetry of communication flows, various forms of relational analysis (discussed previously in this paper) seem especially appropriate.

So far, we have discussed variables relating to the nature of communication system operating in an organization irrespective of the <u>type</u> of messages (or innovations) and of communication channels used for diffusing the messages (e.g., mass media, or interpersonal channels). Other communication variables are the nature of innovation (e.g., individual versus collective*, technological versus re-

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*<u>Collective innovation decisions</u> are defined as decisions in which the individuals in a social system adopt or reject by consensus, and all must conform to the system decision.

structuring) and the attributes of the innovation (for example, whether it is compatible with the system's norms, whether it is highly advantageous over the old practice it replaces, etc.) Although these are also important determinants of the nature and speed of diffusion within organizations, these variables are not discussed here in detail because of their detailed treatment elsewhere.

The communication variables which have been discussed in this section are often 'intervening' in nature and are to some extent determined by other organizational variables (such as leadership style, decision-making structure, etc.). This leads us to the discussion of social system variables.

Social System Variables

Organizational scientists have been concerned with studying the relationship of organizational effectiveness to such variables as the system's norms, leadership, degree of centralization in decision-making, methods of supervision, etc. These variables have been almost entirely neglected in studies dealing with diffusion in organizations.

1. Social system norms have an inportant bearing on the diffusion and adoption of new ideas. Norms are patterns for behavior. If a system's norms are progressive and encourage change, as in school systems like Cape Kennedy, Shaker Heights, Troy, and Newton, educational innovations are likely to diffuse rapidly. If the norms are traditional, however, teacher acceptance of new ideas is likely to be relatively much slower. There is evidence from numerous studies that a system's norms affect the rate of diffusion (Rogers with Shoemaker, 1968). Consider two identical, equally well-trained teachers who have just graduated from college. One is employed in

Newton, Massachusetts, and the other in Cassopolis, Michigan. At the end of one year, we would expect a major difference in the adoption of innovations by the two teachers.

2. Leadership makes an important contribution to organizational effectiveness (Likert, 1961). The style of leadership recommended by Likert (1961, p. 103) is best illustrated as the "principle of supportive relationships", defined as "a maximum probability that in all relationships with the organization each member will, in the light of his background, values, and expectations, view the experience as supportive and one which builds and maintains his sense of personal worth and importance." This supportive leadership climate creates the conditions that lead to a full and efficient flow of relevant messages in all directions throughout the organization. This full and open flow of useful information provides accurate data to guide action, to call attention to problems as they arise, and to assure that sound decisions based on all available facts are made (Likert, 1961, pp. 238-239). This kind of communication system will tend to facilitate the free flow of innovations in the organization, and will encourage organizational members to discuss the innovation with their superiors, which will hopefully lead to adoption of innovations by the organizational members.

3. Decision-making structure. Some organizations are characterized by centralized decision-making structure in which most of the decisions are made at the top of the organization. This does not contribute to motivate implementation of the decision by the system's members. Non-participation often creates

resistance, especially in educational organizations, where teachers often perceive themselves to be capable of making innovation decisions. On the other hand, if the organization's members (teachers) are involved in innovation decisions affecting them, there will be more motivation to implement the decisions. Also, the quality of the decisions will tend to be better, as the decisions are made in light of more technical and professional knowledge and better understanding of the problem under concern. This participantive decision-making seems to provide a better climate for the adoption of innovations among teachers. Also, the participation of organizational members in decision-making facilitates a more thorough discussion and evaluation of the innovation, and only sound and relevant innovations will be adopted. So the problem of <u>too-hasty</u> adoption* will be partly eliminated.

Evidence supporting the proposition that participation of the system's members in innovation decisions leads to a more rapid rate of adoption is provided by an analysis in six urban school districts. Gittell and Hollander (1968, p. 197) found that "because participants in the policy process are so limited, alternatives are also limited, and school policy choices are narrowly conceived. Innovation is rare, and creativity, competition, and experimentation are discouraged."

4. Characteristics of the system affecting behavior of its members. Recognizing the continuous need for organizational change to insure organizational survival in a changing environment, many formal organizations develop an internal unit concerned with sensing

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*"Several authorities have even claimed that a new problem has emerged in many schools - the problem of too hasty adoption" (Sieber, 1967, p. 2.)

the need for change and enabling self-renewal. These units are called research and development, market research, educational development unit, etc. Gardner (1963, p. 76) described the purpose of such an adaptive unit: "Perhaps what every corporation (and every other organization) needs is a department of continuous renewal that would view the whole organization as a system in need of continuing innovation". In a large school system such a self-renewal or adaptive unit could select appropriate innovations to meet the school's changing needs, encourage innovation trials and demonstrations, and seek to promote the wide-spread adoption of new ideas throughout the school.

The presence of such an adaptive or self-renewal unit should speed up the diffusion process. Obviously there are also many other system variables that affect the diffusion of innovations; an example is the degree of consensus or agreement in the system, which we expect to encourage innovation. Likewise, there are many other structural effects on diffusion in organizations; few have yet received adequate research attention.

Consequences Variables

It has been said that this is a time of great innovation but very little change in education. The point is that many new ideas are being promoted and adopted in our educational institutions, but the end result is little alteration in the corpus of education. We simply do not know much about the consequences of the diffusion of innovations. Many educational innovations have been of a fadlike nature, and after their widespread adoption, it has been difficult to measure increased educational achievement. Other innovations in education with a similarly low degree of relative advantage have been

adopted, but then discontinued after a short time.

This problem suggests the need for including the study of consequences of innovation-adoption in our paradigm of needed research on diffusion in educational organizations. Past researchers have asked the question: "What are the correlates (i.e., antecedents) of educational innovativeness? "The numerous studies of Paul Mort and his students at Columbia University* were of this type. They found that more innovative schools were characterized by greater wealth, more cosmopolite school staffs, etc. These findings are highly useful if one wishes to understand innovativeness of school systems. But the study of such dependent variables (like innovativeness) is not enough. Our research should try to explain the <u>consequences</u> of innovation in education, especially educational quality and efficiency, rather than innovativeness or other diffusion effects per se. Figures 2 and 3 show our enlarged model for educational diffusion research, in contrast to the paradigm utilized in most past research (Rogers, 1965).

What specific advantages would accrue from using this expanded model in conducting future research on educational diffusion? A crucial question to be answered in such a study would certainly be: "What improvements in educational productivity or quality result from the adoption of each innovation?". If the answer were known, we predict that the rate of adoption of educational innovations <u>with high relative advantage</u> would increase; correspondingly, those new ideas without sufficient relative advantage would be

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*These studies are summarized in Ross (1958). Actually, these researchers assumed that more innovative schools (they termed them more "adaptable") had higher quality instruction, but they presented no evidence of this relationship.

Figure 2. Model for Educational Diffusion Research Utilized by Most Past Researchers.

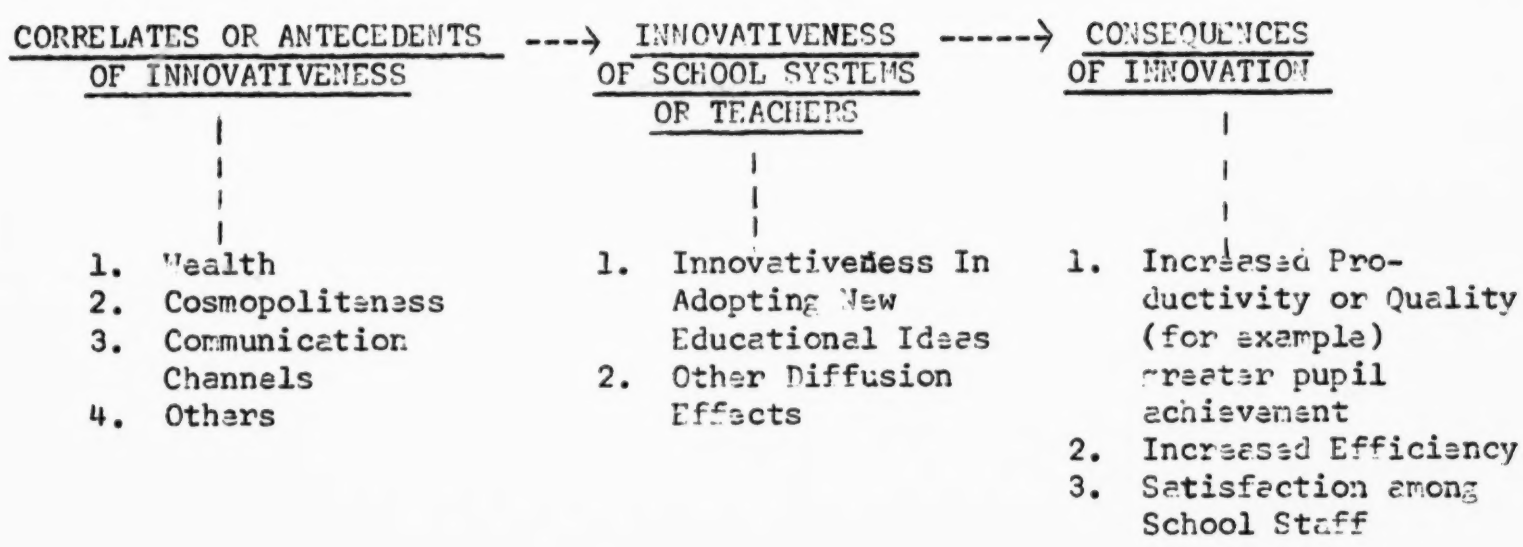
CORRELATES OR ANTECEDENTS OF INNOVATIVENESS
1. Wealth
2. Cosmopoliteness
3. Communication Channels
4. Others
INNOVATIVENESS OF SCHOOL SYSTEMS OR TEACHERS
1. Innovativeness In Adopting New Educational Ideas
2. Other Diffusion Effects
CONSEQUENCES OF INNOVATION
1. Increased Productivity or Quality (for example) greater pupil achievement
2. Increased Efficiency
3. Satisfaction among School Staff

Figure 3. An Enlarged Model for Educational Diffusion Research.

dropped from our promotional efforts, as they should be.

There are, of course, other consequences of educational innovation than changes in educational quality and productivity, and these need investigation too. Organizational researchers have been concerned with such dependent variables as member-satisfaction or morale, efficiency, etc. These variables, then translated in terms of educational organizations, may provide meaningful indicators of innovation consequences. By studying such effects, it is possible to integrate research results from educational diffusion studies with the research literature on organizations, as both will be concerned with similar dependent variables.

With our paradigm (Figure 1), the diffusion effect variables (discussed earlier) are a sort of "intermediate dependent variables" and the consequences variables are more "ultimate" dependent variables. Use of the new research model as a general guide for research on educational diffusion will undoubtedly yield evidence of <u>undesirable</u> as well as unanticipated consequences of innovation.

Other research traditions on the diffusion of innovations have been as amiss as education in failing to view the correlates of innovativeness as only preliminary steps toward the explanation of more ultimate innovation consequences. For instance, rural sociologists studied the correlates of agricultural innovativeness, but not the results of this innovativeness in explaining higher farm production, greater farm profitability, etc. Likewise, concern with the adoption of family planning methods has only partly included the consequences of this adoption in terms of lower fertility rates. Only the anthropological diffusion tradition has placed proper

emphasis upon the consequences of innovation. So our point is that researchers on educational diffusion need to learn from the anthropologists, and like them, stress the consequences more and the antecedents less in the study of innovation.

SUMMARY AND CONCLUSIONS

Our point of departure in this paper is that in spite of the volume of research attention devoted to the diffusion of innovations, relatively little emphasis has been placed upon diffusion within organizational structures. Our paper calls for directions in which such needed inquiry might profitably take.

Methodologically, we call for relational analysis, in which the unit of anlaysis is a dyadic pair, a sociometric chain, or cliques or sub-systems as indicated by a matrix of communication relationships. We feel that past diffusion research has overemphasized investigation in which the individual, rather than the communication relationship, is the unit of analysis. Relational analysis is especially advantageous in determining the nature of heterophily-homophily in diffusion. Homophily is the degree to which two individuals who interact are similar.

We also call, procedurally, for the study of structural effects as system variables in the diffusion of innovations within educational organizations. Structural effects are the consequences of the system's social structure in which one is a member, on his behavior. For instance, teacher innovativeness is partly a function of such independent variables as the teacher's cosmopoliteness, educational level, etc., but teacher innovativeness is also in part a function of such system variables as structural effects.

Conceptually, we call for the study of four interrelated categories of variables; namely, diffusion effects variables, communication variables, social system variables, and consequences variables. The social system variables affect communication variables, which in turn affect the diffusion effect variables, and these diffusion effects lead to consequences variables. We need to focus our attention on such diffusion effects (dependent) variables as attitude toward innovations, innovation-dissonance, extent of knowledge and understanding about innovations, and quality of use of the innovation.

We need to examine the effect of such communication variables as the amount of relevant communication, direction of communication patterns (downward, upward, or horizontal), and the asymmetry of communication flows. Also, we need to study the effects of innovation-attributes and communication channels in diffusing innovations within organizational settings.

The communication variables affecting diffusion are often determined by other social system variables. Hence we need to focus on such social system variables as system norms, leadership style, decision-making structure, etc.

We have often ignored the study of consequences variables which reflect the effects of innovation. We need to analyze such consequences variables as the productivity and quality, efficiency, morale, self-renewal, etc. Thus, we need to enlarge our model of diffusion research in several directions: to include a class of more ultimate dependent variables dealing with innovation consequences, and also toward including social structural variables.

We should also utilize such methodological advances as relational analysis and the study of structural effects in diffusion investigations. Then indeed we will have new wine in new bottles. And the result will provide us with insight into the nature of human behavioral change in organizational settings, as well as implications for more rapid educational diffusion.

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